# Variance calculation

## Software design

Firstly, the variance in voltage is calculated by calling the function getDeviation.

**Function:** unsigned int **getDeviation**(unsigned int\* set, int size, unsigned int mean)

This function returns the variance of an array named “set”, with a number of entries “size” and a supplied “mean”. It does so by implementing the variance equation described in the conceptual design, using floats. A number of different variables are defined, one for each stage of the calculation process. This enables easy debugging of each operation. The value of each is checked before adding it to the progressive total, and excluded if it is unrealistically large. This removes occasional calculation errors that can give incorrect values of the variance.

The final float for variance is cast back into an unsigned integer and returned.

In execution, the function call is getDeviation(ADSamples, VBUFSIZE, aveVoltage). This indicates that the array to be used is the sample of voltage values from the ADC, which has a length of VBUFSIZE, defined as 8. The mean value is aveVoltage which is already available after being calculated by the getAverage function for use as the weight value.

The returned value is then passed through the regular getMass function, with the parameter   
forDev = TRUE. This signals to the getMass function that there is no need to apply an offset to calibrate the voltage into a mass, as explained above.

This is then reported to the user by serial transmission as part of the Statistics menu.